Habitat Expansion Agreement

for

Central Valley Spring-Run Chinook Salmon and California Central Valley Steelhead

Questionnaire Instructions

The attached questionnaire is intended to solicit information needed by the Steering Committee to review projects relative to the criteria established in the Habitat Expansion Agreement. For each proposed action (project), please complete the questionnaire to the fullest extent possible. Please provide citations where applicable and provide a full reference for each citation at the end of this questionnaire (Section X. Supporting Documents). Specific instructions follow.

I. Contact Information

Provide the name of the agency or group making the proposal as well as a contact person for the project. Include contact information such as mailing address, phone number, and email address.

II. Project Description

Provide a descriptive name for the action (project). If the action is listed in the *Working List of Potential Habitat Expansion Actions* (provided during the January 2009 meetings of HEA parties), please include the reference number associated with the action. The project location should specify the watershed or subwatershed (e.g., Deer Creek, Beegum Creek) as well as specific areas within the watershed where the project will be located and what portions of the watershed will benefit from the project. Please include geographic coordinates of the project location(s), if applicable. The project description should be a narrative that provides as much detail as possible about the project.

III. Species Limiting Factors

In this section, indicate the factors that currently limit production of spring-run Chinook salmon and/or steelhead in your watershed. The intent is that the environmental and biological objectives of your project address these limiting factors in some way. Please check one or more of the limiting factors that apply to your watershed. In the second column, describe how and where the factor limits spring-run Chinook salmon and/or steelhead. For each factor that you check, please rank its effect on spring-run Chinook salmon and/or steelhead using the drop-down box in the last column. Finally, we also ask that you describe the source of your conclusions, such as a watershed assessment or other document. Please provide enough information that we can find the document if we need it.

IV. Project Objectives—Environmental

Environmental objectives describe how the project is intended to address the limiting factors to achieve the biological objective described in the next section. Environmental objectives should be as specific and quantitative as possible (e.g., reduce gravel embeddedness in the watershed from 75% to 25% by fencing riparian areas to exclude cattle and allow riparian forest to reestablish). Describe how you think environmental objectives relate specifically to the biological objectives. In the last column, we ask you to describe the environmental objectives as either the primary or secondary focus of the project. For example, a project to plant trees might have a primary focus on riparian/floodplain function with a secondary focus on temperature or water quality.

V. Project Objectives—Biological

Biological objectives describe the anticipated biological response from the project and should be as quantitative as possible. Indicate which species and life stages are the focus of the project. Describe specifically the general condition of the target species in your watershed relative to the historical abundance. The condition of the species should be indicated using the categories in the drop-down box. Species condition categories are defined on the last page of this form. Biological objectives should include the following information: (1) an estimate of the expected contribution of the project in terms of potential adult returns, to the extent possible (and an explanation of how the estimate was developed); and (2) an explanation of how the biological objective for the species is addressed by the action relative to the environmental limiting factors (e.g., the biological objective of an action might be to increase egg incubation survival in a watershed that is currently limited by sediment levels).

VI. Project Cost

To the extent possible, estimate the capital cost of the project, the annual operating and maintenance (O&M) cost, a description of annual O&M activities, and the project lifetime (i.e., how many years O&M activities are expected, including indefinitely, and how long until you expect the project to provide benefits). Provide any confirmed or potential funding partners, or opportunities for cost sharing with other funders or between projects. Also, identify any confirmed or potential partners that might provide maintenance support for the project (funding support or labor support).

VII. Schedule

Describe the project schedule, including a potential start date, construction period, and environmental and biological response times (i.e., the expected time to realize environmental and biological benefits). The last points refer to the maturation period for the project during which time environmental conditions develop. For example, it may take 50–100 years before full environmental benefits (e.g., shading, channel stability, water quality) of planting riparian trees are realized.

VIII. Feasibility

Describe the feasibility and challenges of the project. Feasibility issues should include primarily technical issues, success of projects utilizing similar technology, and particular challenges posed by the specific project. Other issues of feasibility that may be included are challenges associated with property ownership, permitting, zoning, and other social-economic-legal issues.

IX. Project Support

Describe the support or potential conflicts associated with the project. Specifically, provide supporting and cooperating entities (e.g., agencies, non-governmental organizations). Are there cooperating agencies or groups, aside from the potential funding partners mentioned previously? Describe the degree of local support and any known opposition or conflicts with other parties.

X. Supporting Documents

Provide full references for each citation used to support the information presented in this questionnaire for your project. At a minimum, a reference should include the author(s) name; name of agency/organization (if applicable); title of the document; volume and title of journal, if the document is taken from a professional journal; and publisher, date, and location of publication.

Questionnaire

for

Information on Potential Projects to Support Spring-Run Chinook Salmon and Steelhead in the Sacramento River Basin for the Habitat Expansion Agreement

DUE: Friday, February 13, 2009

Send completed questionnaires to hea@water.ca.gov

I. Contact Information

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II. Project Description

Project Name:	Clear Creek channel maintenance and gravel dispersal flows.
Reference No. or New:	NWC-8
Project Location:	Clear Creek downstream of Whiskeytown Dam

Project Description:

The project would provide high flows in Clear Creek to reactivate natural geomorphic processes that create and maintain anadromous habitat. More specifically the flows would 1) move gravel stockpiles downstream into locations where it will create additional spawning habitat for Chinook and steelhead and 2) clean deleterious fine sediment from spawning areas thereby increasing fish production.

Reclamation operates Whiskeytown Dam which limits high flows on Clear Creek. Whiskeytown's controlled outlet capacity of 1,200 cfs, is much less than the minimum targeted release of 3,250 cfs for one day or the optimal goal of 4,000 to 6,000 cfs for 2 to 3 days. It is proposed that high flows could be obtained by operating the reservoir to cause water to flow into the gloryhole overflow spillway. Flood flows can be somewhat managed by increasing

II. Project Description

diversions from Whiskeytown reservoir into the Spring Creek tunnel (4,000 cfs) or by decreasing diversions from the Trinity River into Whiskeytown (3,400 cfs). These flows would be targetted toi occur 3 times over a ten year period.

The FWS was awarded directed action funding by the CALFED ecosystem Restoration Program, but the contract was not finalized before work was stopped due to the State budget crisis and bond funding suspension. These funds were intended to finish implementation and monitoring plans needed before Reclamation can approve or deny the project. Additional dam safety analyses by Reclamation related to the current level of dam safety are also pending. The grant was based on a full proposal for the project and an extensive technical analysis culminating in the "Evaluation of Environmental Water Program (EWP): Pilot Re-operation of Whiskeytown Dam" (USBR and ESSA Technologies 2008). The Clear Creek Decision Analysis Model (CCDAM) was developed for CALFED specifically to aid inplanning and implementing this project (Alexander et al, 2000)

The overall vision of a pilot project of flow augmentation for lower Clear Creek is to release discharges of sufficient magnitude, duration and frequency, with appropriate timing to reactivate more natural fluvial geomorphic processes. These processes are fundamental for creating and maintaining the diverse template of habitats required in the Clear Creek ecosystem to recover and sustain aquatic and riparian species, particularly anadromous salmonids and native floodplain and riparian vegetation. This vision is founded on documented evidence of adverse changes to aquatic and riparian habitat that have occurred in lower Clear Creek since European arrival, and is intended to maximize the benefit achieved with previous and on-going restoration projects. The project vision has been designed to meet the objectives of the Environmental Water Program and several of the goals of the CBDA Ecosystem Restoration Program. Results of the proposed flow augmentation pilot project are intended to inform future processes that decide the feasibility and benefits of an augmented flows program for lower Clear Creek and the adaptive management of such a program.

III. Species Limiting Factors

In this section, describe the limiting factors for spring-run Chinook salmon and steelhead in your watershed. The last page of this questionnaire defines the limiting factors.

Limiting Factors	Description (from back page)	Rank
☒ **Channel Form**	Deficiencies in channel form, channel unit types and structure arise from deficiencies of flow, and substrate (and to a lessor extent large woody debris) which are considered here to the more limiting factors.	Medium
☒ **Channel Unit Types**	see channel form	Medium
☒ **Substrate**	Lack of spawning gravel will soon limit the size of the spring Chinook and steelhead populations, which are quickly growing.	High
☒ **Structure**	see channel form	Medium
☒ **Flow**	Maintaining increased minimum instream flows are esential for maintaining fish habitat and water temperatures for holding, incubation and rearing in Clear Creek. Cold water from the Trinity River has made re-establishment of Spring Chinook and steelhead much more feasible in Clear Creek. Additional high flows are needed to maintain instream/floodplain habitat, and ecological processes, make gravel available for	High

III. Species Limiting Factors

	spawning and to clean out fine sediments from spawning areas.	
☒ **Temperature**	Temperatures are currently very good for all life stages of Spring Chinook, but climate change will make this more of a limiting factor.	Medium
☐ **Water Quality**	Contaminants do not appear to be limiting salmonid populations downstream of Whiskeytown Dam.	Select Rank
☐ **Passage**	Passage deficienies were eliminated with the removal of McCormack-Sealtzer Dam in 2000.	Select Rank
☒ **Riparian/Floodplain**	Problems with floodplain connectivity arise from lack of flows able to access the floodplain.	Low

Source Documents:

DWR, 1986. Clear Creek Fishery Studies.

Kondolf G. M. and J. G. Williams. 1999. Flushing Flows: A Review of Concepts Relevant to Clear Creek, California

McBain and Trush. 2001. Geomorphic Evaluation of Lower Clear Creek downstream of Whiskeytown Reservoir. Final Report. Submitted to the Clear Creek Restoration Team.

Graham Matthews and Associates, 2007. Update of the Clear Creek Gravel Management Plan. Produced for Bureau of Reclamation.

Stillwater Sciences. 2008. Environmental Water Program Pilot Flow Augmentation Project: Draft Full Proposal For Lower Clear Creek. Prepared for Environmental Water Program, California Bay-Delta Authority, Ecosystem Restoration Program, Sacramento, CA. Prepared by Stillwater Sciences, Berkeley, CA.

Giovannetti, S. L., and M. R. Brown. 2008. Adult spring Chinook salmon monitoring in Clear Creek, California: 2007 annual report. USFWS Report. U.S. Fish and Wildlife Service, Red Bluff Fish and Wildlife Office, Red Bluff,

Additional Notes:

The species limiting factors text was reviewed and OK'd by members of the Clear Creek Technical Team Tricia Bratcher (DFG), Jim DeStaso (BOR), and Gary Diridoni (BLM).

IV. Project Objectives—Environmental

In this section, describe how your project will affect one or more of the limiting factors for spring-run Chinook salmon or steelhead described above.

Limiting Factor	Description and Objective	Focus
☒ **Channel Form**		Secondary
☒ **Channel Unit Types**		Secondary
☒ **Substrate**		Primary
☒ **Structure**		Secondary

IV. Project Objectives—Environmental

☒ **Flow**	Primary
☐ **Temperature**	Select Focus
☐ **Water Quality**	Select Focus
☐ **Passage**	Select Focus
☐ **Riparian/Floodplain**	Secondary

V. Project Objectives—Biological

In this section, describe the objective(s) of your project relative to the goal of providing habitat for spring-run Chinook salmon and steelhead. Indicate the species and life stage that are targeted by the project. (It is okay to have more than one species/life stage target).

Target Species: ☒ Spring-Run Chinook Salmon **Population Status Specific to Watershed:** Increasing

Target Life Stages:

☒ Spawning ☒ Egg Incubation ☐ Summer Rearing ☐ Winter Rearing

☐ Juvenile Emigration ☐ Adult Immigration ☐ Adult Holding

Description of Project Objectives:

The contribution of the HEA projects to adult returns was estimated using the FWS report "Restoration of Salmon and Steelhead in Clear Creek" (Aceituno 1985) which was based on a 1983 Instream Flow Incremental Methodology study presented in the Clear Creek Fishery Study (DWR 1986) that is the basis for the current Clear Creek flow regime. The objective of Aceituno 1985 was to assess the benefits of restoring spawning gravels, controlling fine sediment, improving fish passage at Saeltzer Dam and increasing stream flows. Aceituno presented the estimated carrying capacity (CC) in number of spawning pairs for Clear Creek for salmon and steelhead for both the available / present substrate and potential / perfect substrate. I assumed that the difference in CC between present and perfect substrate represents the potential benefit of both gravel supplementation and fine sediment reduction through either channel maintenance flows or erosion control. I used estimates for the reach upstream of Saeltzer Dam because this is the reach used for spawning by spring Chinook and the reach affected by the proposed HEA projects. I used CC estimates for flows of 200 cfs because they are approximately equal to the current Whiskeytown releases during spring Chinook and steelhead spawning. I assumed a 1 to 1 sex ratio to calculate escapement from spawning pairs.

Chinook CC was 490 for present substrate and 3,122 for perfect substrate, suggesting that an increase in escapement of 5,264 adult spring Chinook (a 540% increase) is possible from restoration actions such as the proposed HEA projects. Steelhead CC was 884 for present substrate and 7,292 for perfect substrate suggesting that an increase in escapement of 12,816 adult steelhead (a 720% increase) is possible. These estimates should be considered in light of: 1) although considerable efforts at improving substrate have occurred since 1983 (Graham Matthews and Associates 2007), only 15% of the length of the spawning reach contains supplemental spawning gravel (Giovannetti and Brown 2008), suggesting that only a small proportion of the potential restoration has occurred; 2) additional degradation has occurred in the 26 years since the DWR study (MCBain and Trush 2000); 3) the amount each project would contribute to the large increases in CC of the habitat would depend in part on how much funding was provided for each project; and therefore 4) I did not apportion these large increases in spring Chinook and steelhead escapement to the individual HEA projects. Reducing the source of fine sediment through erosion control (NWC-13) would also contribute to the increased capacity. There is an interdependency between projects that add

V. Project Objectives—Biological

gravel, projects that provide flows that deliver and clean the gravel and projects that reduce the sources of fine sediment.

Target Species: ☒ Steelhead

Population Status Specific to Watershed: Increasing

Target Life Stages:

☒ Spawning ☒ Egg Incubation ☐ Summer Rearing ☐ Winter Rearing

☐ Juvenile Emigration ☐ Adult Immigration

Description of Project Objectives:

see above for spring Chinook.

VI. Project Cost

Capital Cost:	$2,300,000 to $8,500,000 depending mainly on the level of monitoring. The first estimate is based on the level of funded awarded by CALFED ERP for the pilot flow year and the second estimate is based on the Full Proposal for the project produced for the Environmental Water Program (Stillwater Sciences 2008). Most of the cost of the project is for monitoring and the rest is to repay the cost of foregone power generation. However, CALFED ERP contract with the FWS for one time implementation was for $813,745 which included development of implementation and monitoring plans not included in EWP estimate. The grant allocated about $400,000 for planning, $259,434 for foregone power, and about $150,000 for monitoring and project management. Based on this rate, 10 years of implementation would cost $2,300,000. The actual cost could be somewhere in between for 10 years of implementation.
Annual Operation and Maintenance Cost:	None
Annual Operation and Maintenance Description:	All costs are included in the initial estimate.
Project Lifespan:	10 years
Project Partners (Funding):	CVPIA, CALFED ERP
Project Partners (Maintenance):	DFG, BLM

VII. Schedule

Proposed Start:	2012
Expected Time to Completion:	2022
Expected Time to Realize Environmental Benefits:	1-3 years
Expected Time to Realize Biological Benefits:	1-3 years

VIII. Feasibility

Technical Feasibility:	Extensive study has gone into this project (Kondolf and Williams 1999, USBR 2000, ESSA 2000, USBR and ESSA 2008 and Stillwater Sciences 2008).. Reclamation may not want to implement the project based in part on dam safety studies which are not finished.
Technical Challenges:	The current ERP grant focuses on developing weather and flow forecasting tools and facilitating process and communication which are the current challenges. Reclamation is looking into how to correct existing dam safety issues.
Related Projects:	Gravel placement and injection projects in the waterhsed would greatly benefit from flows which would make the gravel usable and create additional habitat. See HEA questionaires "Clear Creek Long-term spawning gravel supply" and "Clear Creek gravel supplementation in the reach where spring Chinook spawn" which would produce synergistic effects.
Ownership or Permitting Challenges:	Most of the Clear Creek floodway is managed by BLM or NPS.
Conflicts with Cultural, Zoning, or Other Issues:	Consultation with the City of Redding will be required related to flood zoning after additional modeling suggests how the project would effect the floodplain. Initial studies suggested the project was feasible from this standpoint.

IX. Project Support

Supporting Entities:	FWS, CALFED ERP, and Reclamation have been working determine the feasibility of the project. Reclamation has concerns about dam safety that need to be resolved.
Cooperating Entities:	DFG
Degree of Local Support:	High
Known Opposition:	None

X. Supporting Documents

Please provide a full reference for each citation used to support the information presented in this questionnaire.

Aceituno, M. 1985. Restoration of Salmon and Steelhead in Clear Creek. Central Valley Fish and Wildlife Management Study. U.S. Fish and Wildlife Service Division of Ecological Services, Sacramento CA.

Alexander, C.A.D., D.R. Marmorek, and C.N. Peters. 2000.Clear Creek Decision Analysis and Adaptive Management Model: Results of a Model Design Workshop held January 24th-26th 2000. Draft report prepared by ESSA Technologies Ltd., Vancouver, BC for CALFED Bay-Delta Program, 1416 Ninth Street, Suite 1155 Sacramento, CA 95814, 96 pp. and appendices.

Kondolf, G. M. and J. G. Williams. 1999. Flushing Flows: A Review of Concepts Relevant to Clear Creek, California. Report for the Fish and Wildlife Service, Red Bluff, CA.

DWR, 1986. Clear Creek Fishery Studies.

Giovannetti, S. L., and M. R. Brown. 2008. Adult spring Chinook salmon monitoring in Clear Creek, California: 2007 annual report. USFWS Report. U.S. Fish and Wildlife Service, Red Bluff Fish and Wildlife Office, Red Bluff,

Graham Matthews and Associates, 2007. Update of the Clear Creek Gravel Management Plan. Produced for Bureau of Reclamation.

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Stillwater Sciences. 2008. Environmental Water Program Pilot Flow Augmentation Project: Draft Full Proposal For Lower Clear Creek. Prepared for Environmental Water Program, California Bay-Delta Authority, Ecosystem Restoration Program, Sacramento, CA. Prepared by Stillwater Sciences, Berkeley, CA.

U.S. Bureau of Reclamation and ESSA Technologies Inc. 2008. Evaluation of Environmental Water Program (EWP): Pilot Re-operation of Whiskeytown Dam. Technical Memorandum NO. WHI-8130-IE-2008-1 prepared under contract with the Fish and Wildlife Service

Definitions of Limiting Factors for Spring-Run Chinook Salmon and Steelhead

Channel Form

This attribute describes changes to the channel, including incision, aggradation, diking, armoring, and other modifications of the channel adversely affecting spring-run Chinook salmon and steelhead.

Channel Unit Types

Examples of geomorphic features of the channel that form habitat types for spring-run Chinook salmon and steelhead are pools, riffles, glides, and runs. This attribute describes changes in the frequency and size of such features. For example, removal of large wood may reduce the frequency of pools, presence of steps, or retention of gravel for riffles.

Substrate

This attribute describes changes in the composition of the substrate of the stream, including increase in fine sediment and lack of gravel recruitment.

Structure

This attribute describes the loss of structural elements in the stream such as large wood, boulders, undercut banks, and so on. Loss of structure results in a simplification of the channel and influences Channel Form and Channel Unit Types.

Flow

This attribute addresses modification of the flow regime, including decrease in summer low flow, increased "flashiness," and dewatering of the channel as a result of withdrawals.

Temperature

Change in water temperature can be attributable to human actions such as removal of riparian shading. This attribute describes the increase in summer water temperature and the loss of temperature refugia (springs or groundwater) as a result of human actions.

Water Quality

This attribute pertains to the input to the stream of toxins or pollutants that produce adverse impacts on spring-run Chinook salmon or steelhead. This can include chemical pollutants such as fertilizer and pesticides and nutrient sources such as cattle and feedlots.

Passage

This relates to the effect of impediments to adult or juvenile migration of spring-run Chinook salmon or steelhead, including dams, culverts, channel dewatering, and other structural and channel modifications. Please describe the location of the passage impediment and describe the extent of impediment (i.e., a complete or partial blockage to migration).

Riparian/Floodplain

This attribute describes the loss of functionality of the riparian forest/vegetation and the connection of the stream to the floodplain during high water and flooding.

Population Condition Definitions for Section V. Project Objectives—Biological

Increasing

Adult returns of the target species to the watershed have generally been increasing over the last several years; expectations are that the species is displaying characteristics of a rebuilding or healthy population.

Stable

Adult returns of the target species to the watershed show no clear trend over the last several years.

Decreasing

Adult returns of the target species to the watershed are declining over the last several years; the decline in abundance is a cause of concern and characteristic of a potentially unhealthy population.

Intermittent

Adult returns of the target species are occasionally seen in the watershed, but there is no viable or sustained population in the basin.

Extirpated

The population has been eliminated from the watershed although the species was present in the past.